

A Peculiar Condition of Iron

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and cease to act; but there is no current through the galvanometer, for both change together.

When iron was associated with gold or charcoal, the phenomena were the same. Using steel instead of iron, like effects ensued.

One of the most valuable results in the present state of this branch of science which these experiments afford, is the additional proof that *voltaic electricity is due to chemical action^ and not to contact*. The proof is equally striking and decisive with that which I was able to give in the sixth part of my *Experimental Researches* (par. 615). What indeed can show more evidently that the current of electricity is due to chemical action rather than to contact, than the fact that though the contact is continued, yet when the chemical action ceases, the current ceases also?

It might at first be supposed that in consequence of the peculiar state of the iron, there was some obstacle, not merely to the *formation* of a current, but to the *passage* of one; and that, therefore, the current which metallic contact tended to produce could not circulate in the system. This supposition was, however, negatived by removing the platina wire into a second cup of nitric acid, and then connecting the two cups by a compound platina and iron wire, putting the platina into the first vessel, and the iron attached to it into the second. The second wire acted at the first moment, producing its corresponding current, which passed through the first cup, and consequently through the first and inactive wire, and affected the galvanometer in the usual way. As soon as the second iron was brought into the *peculiar* condition, the current of course ceased; but that very cessation showed that the electric current was not stopped by a want of conducting power, or a want of metallic contact, for both remained unchanged, but by the absence of chemical action. These experiments, in which the current ceases whilst contact is continued, combined with those I formerly gave, in which the current is produced though contact does not exist, form together a perfect body of evidence in respect to this elementary principle of voltaic action.

With respect to the state of the iron when

inactive in the
j nitric acid, it must not be confounded with the
inactive state
1 of amalgamated or pure zinc in dilute sulphuric
acid". The
distinction is easily made by the contact of platina
with either
J in the respective acids, for with the iron such
association do~~
j nothing, whereas with the zinc it develops the full
force of f